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it advanced into Ohio. At the morning observation of this date, pressures .5 to .6 inch below the mean were noted in Iowa.

Reports of hail on the 13th, 14th, and 15th, sometimes of astonishing size, have been sent from thirty-six stations, mostly in Iowa, Kansas, Missouri, Indiana, and Illinois. The following is a brief summary of tornado reports. Indiana: Amity, 14th, 7.30 P.M.; Waterloo, night of 14th, only three houses left standing; Muncie, night of 14th; Indianapolis, 14th, 6 P.M. In Kansas: Troy, 13th, 5 P.M.; Muncie, 13th, 4.30 P.M., most violent storm ever known in the county. In Michigan: White Pigeon, 14th, 4 P.M.; Sturgis, 14th, 3.30 P.M., came from south-east. In Missouri: Kansas City, 13th, 4.30 P.M., from south-west, track from a hundred and fifty to two hundred and fifty yards wide, damage \$300,000; Cameron, 13th, 5 P.M.; Macon, 13th, 8 P.M.; Pattonsburg, 13th, 5 P.M. In Ohio: Frederickstown, 14th, afternoon.

The second period was ushered in by a deep 'low' in Colorado on the 17th. At 11 P.M., Washington time, pressures at Yankton and North Platte were 29.16 inches, or more than .7 inch below the mean. On the 18th the 'low' moved into Minnesota, and on the 20th a portion of it moved east into the St. Lawrence valley; while its influence was felt in forming a second subsidiary 'low' in western Tennessee on the same date. The latter moved slowly, and passed off the Atlantic coast on the 24th. Tornadoes are reported as follows. In Arkansas: Eureka Springs, 18th; it cut a path a quarter of a mile wide through a dense forest, and destroyed several buildings. In Illinois: Hillsboro', 18th, 10 P.M., a funnel-shaped cloud moving north-east, the width of destruction, ten to thirty rods; Grafton, a car loaded with stone weighing twenty-one tons was lifted from the track, and the stones were scattered; Chemung, 18th, before 6 P.M.; Chicago, night of 18th; Springfield, 18th, 7.10 P.M.; Pesotum, 18th, 11.30 P.M.; Littleberry was nearly destroyed; Jacksonville, 18th evening, severest storm ever known; Edwardsville, 18th evening, came from south-east, width of track six hundred to eight hundred feet; Tallula, 18th, 9 P.M. Up to midnight of 19th, the number of deaths in Illinois caused by the tornadoes of this date was sixty-three. In Missouri: Moody, 18th, 19th, every house blown down; Berger, 18th, 7 P.M., six houses and one mill destroyed; Oronogo, 18th, 7.40 P.M., six persons killed, \$75,000 damage. New York: 21st, one of the severest storms that ever visited Long Island. In Tennessee:

Chattanooga, 20th, 4 P.M. In Wisconsin: Janesville, 18th evening; Racine, 18th, 7 P.M., twenty-five people killed, damage \$60,000, track five hundred yards wide.

The chart of monthly isobars, isotherms, and wind-directions is given on p. 35. The permanent summer low-pressure area has enlarged a little, and moved only slightly from its position last month. Mean pressures are in general below the normal, except in Florida and the upper Missouri valley. The mean temperature east of the 100th meridian was 3.1° below the mean; highest temperature, 109° at Eagle Pass, Tex., and Yuma, Cal. Illinois and Missouri report damaging frosts on the 22d.

A comparison of floating ice with May, 1882, shows the eastern limit 3° west of last May, but the southern limit is the same. The number and size of icebergs are much less than last year, while there has been no field-ice. The Gulf of St. Lawrence, blocked last year, is clear this.

There were deficiencies in rainfall: Middle Atlantic, .58 inch; West Gulf, 1.50; Rio Grande valley, 2.93; extreme north-west, 1.65; and middle plateau, .69. Excesses: New England, 1.41; South Atlantic, 2.91; Tennessee, .54; Ohio valley, .77; lower lakes, 3.02; upper lakes, .85; upper Mississippi valley, .68; Missouri valley, 3.03; middle slope, 1.09; southern slope, 1.91; northern plateau, .99; North Pacific coast, .86; Middle Pacific coast, 2.33; and Southern Pacific coast, .80. In California the rain has been four times the usual May fall.

A hundred and thirty-nine cautionary signals were displayed, of which 84% were justified by winds of 25 miles or more per hour, at or within 100 miles of the station.

SYMMETRICAL LINEAR FIGURES PRODUCED BY REFLECTION ALONG A RIVER-BANK.

In July, 1882, I noticed on the Magaguidavie River, in New Brunswick, some figures, apparently formed through combination of actual fissures in the rocks at the water's edge, and the reflections of these fissures from the surface of the water, which were not a little remarkable.

It was late in the afternoon. One thunder-shower had just ceased, and another was about to begin. The sky was somewhat overcast, and the water more or less shaded by the forest which covers most of the adjacent land. The banks of the river are bold, the shore being lined in many places with steep rocks having abrupt

faces. Thanks to the lifting of the salt or brackish water by the tides, the boughs of the trees which overhang the river are trimmed off sharply and squarely, as if by shears, at a plane which marks the limit reached by the water of the highest tides. By the same means, the rocks on the strand are kept clear of vegetation; so that there is ordinarily a well-defined wall of bare rock between the water and the trees, even when the tide is high, and the river not far from being full. At the time I am speaking of, there was no wind: the surface of the water was absolutely glassy, and a superb reflection of the foliage of the forest was to be seen in the mirror which the river made. I had just remarked to a chance companion on our little steamboat how difficult it was to distinguish between the water and the land, so completely were the real rocks and trees blended with their reflections, when my attention was attracted by a rock, apparently at the water's edge, which was covered with symmetrical lines and figures. I called out to a friend, who was standing at some distance from me on the deck of the boat, to 'look at the pictured rock,' and, on turning from him to again look at the shore, I perceived that it was not one rock alone that bore figures: there was a long, broad ribbon or dado of similar picturing at the edge of the water, running along the shore between the real trees and the picture produced by the reflection of the trees in the water. I am fortunate in being able to say that my friend saw the picturing on the rock to which his attention was thus hastily directed, for the fact enables me to dismiss the notion that the figures might possibly have been 'subjective' to myself. I had, however, hardly time enough to get a fair view of the picture before a new shower of rain ruffled the water, hid the shore, and drove us under cover.

Beside herring-bone patterns, there were symmetrical lines, bars, and flutings of various lengths, together with figures suggesting short maces, staves, or even spears and arrows, as well as others in the semblance of hieroglyphics. Indeed, the whole effect was very Egyptian-like; while many of the lines recalled those so commonly used of late years for ornamenting furniture,—such lines as are, I believe, technically called 'reeding.'

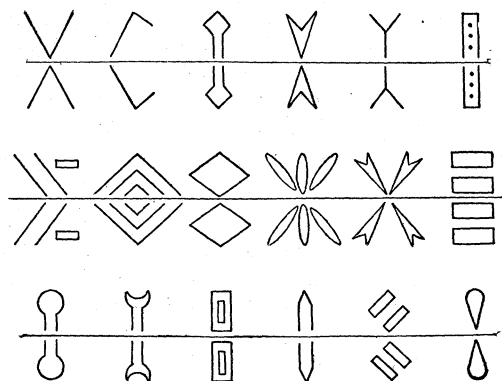
On thinking the matter over, I was at first inclined to believe that I must have been looking into a great natural kaleidoscope; but, on further consideration and observation, it seems plain that simple reflection—that is to say, duplication by the water-mirror of lines, cracks, dents, or scars upon the rocks—might account

for most, if not for all, the appearances I witnessed. I regret that the attitude of mere wonder and admiration into which my mind was thrown should have hindered me for the moment from making a proper critical examination of the figures; but I have been impressed by the conceptions that similar appearances cannot possibly be infrequent when the water of the river is still, and that some of the first rudiments of primitive art did probably originate in efforts made to copy such natural lineations as these.

There is, I believe, an old, perhaps it is an endless, dispute as to whether, in the history of human art, such kinds of ornamentation as herring-bone figures, reeding, and fluting have ever been derived from a direct imitation of natural objects, or whether they have not always arisen from mental conceptions. It has seemed to me that the observation here recorded should bear with considerable force in favor of the view of those students who refer the beginnings of all things to facts of actual observation and experience.

I am well aware that the atmospheric conditions were of somewhat exceptional character at the moment when I saw the picturing; but it is evident that rock-fissures, properly placed as regards a body of still water, will naturally be duplicated by reflection therefrom. There is every reason to suppose that figures analogous to those I witnessed may often be seen where rocks and water meet, and it is hard to believe that they have not been seen frequently by persons favorably situated. There is consequently no improbability in the idea that some of the primitive designs of savage nations may have been copied from them. Different effects would, of course, be produced in different localities, according to the quality and mode of stratification of the rocks, and to the nature of the jointings, seams, and scars which the rocks bear; and it is not unlikely that the rocks on the Magaguidavic River may be peculiarly well fitted for exhibiting these pictorial effects. But the capital fact of duplication by reflection must be common to all localities; and there are probably many places where ornamental figures would be produced by mere force of repetition even of very simple forms; that is to say, by the formation, at one and the same time, of a series of figures comprising many individual reflections, each one of which was similar to all the rest. A general idea of some kinds of forms that may possibly be seen where cracks in rocks are reflected from a body of calm water may be got by drawing figures like those of the diagram which I have selected

from a hundred or more that occurred to me. No effort has been made in the diagram to copy the actual appearances seen on the river-bank.



An essentially different style of representation would be needed in order to convey a just conception of the effect of the scene I witnessed. With the exception of the herring-bone figure, I cannot profess that either of the figures of the diagram is like any of those I saw in New Brunswick. It is to be remembered, however, that, whatever the forms may be that are produced by reflection from one particular bank of rock, the same kinds of forms will usually and probably be repeated again and again with the result that a pattern or 'design' will be produced.

I consider myself so little qualified to look up a matter wholly foreign to my usual studies, that I have made no effort to search for records of observations similar to the one here described, though I am strongly inclined to believe that such records must exist. I would say merely, that on again steaming up the Magaguidavic River at a time when a breeze was stirring, and the surface of the water was ruffled, I saw none of the picturing excepting in one quiet nook or cove, where a series of really superb herring-bone figures was produced by reflection from the surface of the calm water of the lines of stratification between the beds of rock, which were here tilted at a considerable angle. Although during this second visit I saw none of the 'reeding,' or of the other kinds of symmetrical figures which had so much impressed me before, the multiplicity of the herring-bones, i.e., the continued repetition of this figure, was specially noteworthy. A peculiar kind of beauty or sense of satisfaction to the eye was thus obtained, which a single figure would clearly not have been competent to give. It is reasonable to suppose, that wherever

complete herring-bone figures are formed, as here, by reflection of those lines between the layers of rock which are continuous, and, so to say, perfect, a variety of related or derived figures will be produced by the reflection of lines which are not continuous; that is to say, the reflections from lines that are imperfect in any way, or broken into various lengths, would give rise to hieroglyphic characters in considerable variety, though they might all belong to one common group or kind.

At the time of my second visit to the river, I could see no reason to doubt that the figures might be seen almost any day when the time of high tide, and consequently of a full river, happened to be coincident with the calm moments so common in summer at the hours not far from sunrise and sunset.

As bearing on the question of human imitation, it is of interest to note, that while herring-bone patterns would naturally be produced wherever the lines of stratification of tilted layers of rock are reflected from calm water, i.e., in numberless localities, it is precisely these figures which have been most frequently delineated by savages upon pottery and other implements as one of their earliest artistic efforts.

Excepting the two instances here recorded, I have never noticed any such figures in the course of my own travels, nor have I heard of their being seen by others. I am assured, moreover, by several of the most competent and experienced observers of my acquaintance, that they have never witnessed any thing similar. I expect, however, for my own part, to see such figures from this time forth, when opportunity offers, and I trust that many other persons will do so. It is to be hoped, withal, that some of the more noteworthy effects of this sort may be accurately depicted.

F. H. STORER.

THE AMERICAN SWAMP CYPRESS.

THE following observations on the bald or swamp cypress of the southern states are condensed from the forthcoming second volume of the memoirs of the Kentucky geological survey. They embody the results of certain inquiries which show that this peculiar tree deserves more study than has been given to it by our botanists.

The *Taxodium distichum* is, as is well known, a common tree in the swamps of the southern states, extending from New Jersey to Texas, and northwardly in the Mississippi valley, to the lowlands of southern Illinois. It has several titles to distinction: it is not